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⑳ Applicant: **NEC CORPORATION**
7-1, Shiba 5-chome
Minato-ku
Tokyo 108-01 (JP)

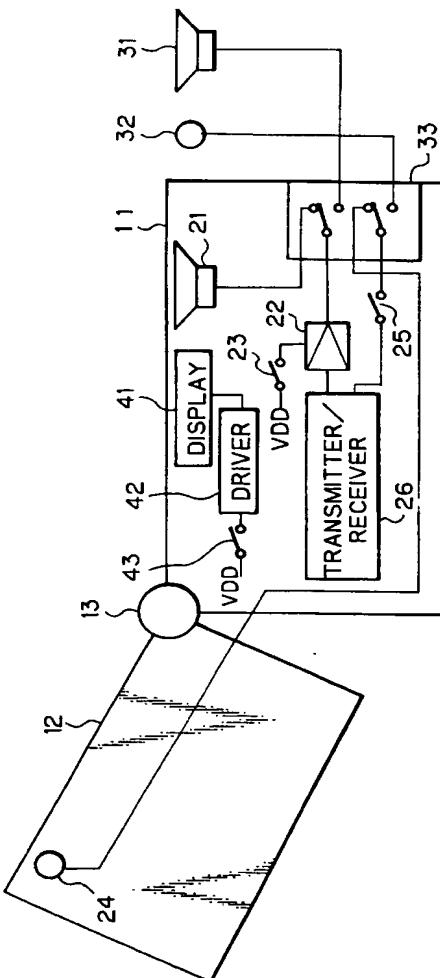
⑷ Inventor: **Takizawa, Hiroshi**
c/o NEC Corporation,
7-1, Shiba 5-chome
Minato-ku, Tokyo (JP)

⑵ Representative: **Moir, Michael Christopher et al**
MATHYS & SQUIRE,
10 Fleet Street
London EC4Y 1AY (GB)

⑷ Portable telephone.

⑷ A portable telephone having a first and a second box-like casing part which are foldably connected by a hinge. The first casing part accommodates at least a display and a speaker while the second casing part accommodates at least a microphone. When the two casing parts are folded, a control circuit interrupts power supply to the display, microphone, and speaker.

Fig. 1



BACKGROUND OF THE INVENTION

The present invention relates to a foldable portable telephone and, more particularly, to a foldable portable telephone whose operation is adequately controlled on the basis of the folded/unfolded position thereof.

There has been proposed a foldable portable telephone which allows, in a folded position, the user to operate a power switch thereof and see the ON/OFF state of the switch and the reception of a call, as disclosed in Japanese Patent Laid-Open Publication (Kokai) No. 4-11655 by way of example. There has also been proposed a telephone having a cover for protecting a switch section when folded, and a calculator module provided on the cover, as taught in, for example, Japanese Patent Laid-Open Publication No. 4-117848.

However, none of the conventional portable telephones gives consideration to the control over transmission and reception to occur in the folded position. Specifically, howling is apt to occur when a microphone and a speaker built in the telephone are brought close to each other. Moreover, even when the telephone is folded, a display and other devices powered by a battery consume power, reducing the life of the battery.

SUMMARY OF THE INVENTION

It is therefore, an object of the present invention to provide a foldable portable telephone which eliminates howling when a microphone and a speaker thereof are brought close to each other.

It is another object of the present invention to provide a foldable portable telephone capable of extending the life of a battery incorporated therein.

A foldable portable telephone of one aspect of the present invention comprises a first casing part accommodating at least a display and a speaker, a second casing part accommodating at least a microphone, a hinge connecting the first and second casing parts foldably to each other, and a control circuit for interrupting, when the first and second casing parts are folded, a power supply to the display, microphone, and speaker.

In another aspect the invention provides a foldable portable telephone comprising a first casing part accommodating at least a speaker; a second casing part accommodating at least a microphone; hinge means connecting said first and second casing parts foldably to each other; an amplifier for driving the speaker; a display and a driver circuit for driving the display; and means for interrupting, when said first and second casing parts are folded, a power supply to said display driver circuit and said amplifier.

BRIEF SUMMARY OF THE DRAWINGS

The above and other objects, features and advantages of the present invention will become more apparent from the following detailed description taken with the accompanying drawings in which:

5 FIG. 1 is a block diagram schematically showing a foldable portable telephone embodying the present invention; and
 10 FIGS. 2A and 2B show a specific arrangement for detecting the folded/unfolded position of the telephone shown in FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

15 Referring to FIG. 1 of the drawings, a foldable portable telephone embodying the present invention is shown. As shown, the telephone is generally made up of a first and a second box-like member or casing part 11 and 12, respectively. The casing parts 11 and 12 are foldably connected to each other by a hinge 13. A microphone 24 is built in the casing part 12. The casing part 11 accommodates therein a speaker 21, an amplifier 22 for driving the speaker 21, a switch 23 for selectively connecting or disconnecting the amplifier 22 to or from a power source VDD, a switch 25 for selectively turning on or turning off the microphone 24, and a transmitter/receiver 26. A jack 33 is provided on the casing part 11 to allow an extra speaker 31 and an extra microphone 32 to be connected to the telephone, as desired. A display 41 is provided on the casing part 11. Also accommodated in the casing part 11 are a driver 42 for driving the display 41, and a switch 43 for selectively connecting or disconnecting the driver 42 to or from the power source VDD. The switches 23, 25 and 43 are controlled on and off by software.

20 When the built-in speaker 21 and microphone 24 are used, the extra speaker 31 and microphone 32 are not connected to the jack 33. In this case, the jack 33 connects the speaker 21 to the amplifier 22 and microphone 24 to the transmitter/receiver 26. When the casing parts 11 and 12 are rotated away from each other, or opened, about the hinge 13, the switches 23 and 25, are automatically turned on. In this condition, the user of the telephone can hold a conversation via the speaker 21 and microphone 24. When the casing parts 11 and 12 are closed, the switches 23 and 25 are automatically turned off. As a result, when the telephone is folded about the hinge 13, the amplifier 22 is disconnected from the power source VDD while the microphone 24 is turned off. Further, the switch 43 is turned off to disconnect the driver 42 from the power source VDD, whereby the display 41 is also turned off.

25 Assume that the extra or outside speaker 31 and microphone 32 are connected to the jack 33 of tele-

phone. Then, the jack 33 connects the outside speaker 31 and microphone 32 respectively to the amplifier 22 and to the transmitter/receiver 26 in place of the built-in or inside speaker 21 and microphone 24. While a conversation is under way, the switches 23 and 25 are continuously turned on. If the casing parts 11 and 12 are not closed in the event of communication, the switch 43 is turned on to cause the driver 42 to drive the display 41. As a result, a message urging the user to close the casing parts 11 and 12 appears on the display 41. As soon as the user folds up the casing parts 11 and 12, the switch 43 is turned off to shut off the power supply to the display 41 and driver 42.

FIGS. 2A and 2B show a specific arrangement for determining whether the casing parts 11 and 12 are open or whether they are closed. As shown, a magnet 51 is affixed to one of the casing parts 11 and 12, e.g. the casing part 12, while a reed switch or similar magnetic detector 52 and a CPU 53 are mounted on the other casing part 11. The CPU 53 determines whether or not the casing parts 11 and 12 are closed in response to the output of the detector 52, the contacts of which are closed when the casing parts are unfolded. Alternatively, a switch, not shown, may be located in the vicinity of the hinge 13 to change state when the casing parts 11 and 12 are closed or opened. The telephone is shown in an unfolded position in FIG. 2A and in a folded position in FIG. 2B.

As stated above, when the speaker 21 and microphone 24 built in the telephone are not used, the casing parts 11 and 12 are closed. As a result, the power supply to the amplifier 22 is interrupted. This eliminates howling despite that the speaker 21 and microphone 24 are brought close to each other.

When the outside speaker 31 and microphone 32 are connected to the jack 33, the switches 23 and 25 are turned on. In this condition, the user can hold a conversation on the telephone by folding it up. At this instant, the jack 33 disconnects the inside speaker 21 from the amplifier 22 and microphone 24 from the transmitter/receiver 26, thereby eliminating howling.

Furthermore, when the casing parts 11 and 12 are closed, the power supply to the display 41 is shut off. This is successful in saving power and, therefore, extending the life of a battery incorporated in the telephone.

It is of course implicit in the foregoing disclosure that when the casing 11, 12 is closed and no conversation is taking place via the external speaker and microphone, the telephone remains able to detect an incoming call and to alert the user to the call. Thus, Figure 1 shows that the transmitter/receiver 26 remains turned-on, so that an incoming call may be received when the casing parts 11, 12 are closed. The software is configured such that upon receipt of a call, switch 23 is transiently closed so as to power-up the amplifier and deliver an alert tone to the speaker 21.

Various modification will become possible for those skilled in the art after receiving the teachings

of the present disclosure without departing from the scope thereof as defined by the appended claims.

5 Claims

1. A foldable portable telephone comprising:
a first casing part accommodating at least a display and a speaker;
a second casing part accommodating at least a microphone;
hinge means connecting said first and second casing parts foldably to each other; and
control means for interrupting, when said first and second casing parts are folded, a power supply to said display, said microphone, and said speaker.
2. A foldable portable telephone comprising:
a first casing part accommodating at least a speaker;
a second casing part accommodating at least a microphone;
hinge means connecting said first and second casing parts foldably to each other;
an amplifier for driving the speaker;
a display and a driver circuit for driving the display; and
means for interrupting, when said first and second casing parts are folded, a power supply to said display driver circuit and said amplifier.
3. A telephone as claimed in Claim 1 or Claim 2, further comprising an extra microphone and an extra speaker removably connectable to said telephone.
4. A telephone as claimed in Claim 3, wherein when said extra microphone and said extra speaker are connected to said telephone, said casing microphone and casing speaker are switched-out.
5. A telephone as claimed in any preceding claim, further comprising detecting means for determining whether or not said first and second casing parts are folded.
6. A telephone as claimed in Claim 5, wherein said detecting means comprises a magnet affixed to one of said first and second casing parts, and a reed switch mounted on the other of said first and second casing parts.
7. A telephone as claimed in any preceding claim, comprising means, operative when the first and second casing parts are folded and an alert tone is required, to supply power to the speaker to generate said alert tone.

Fig. 1

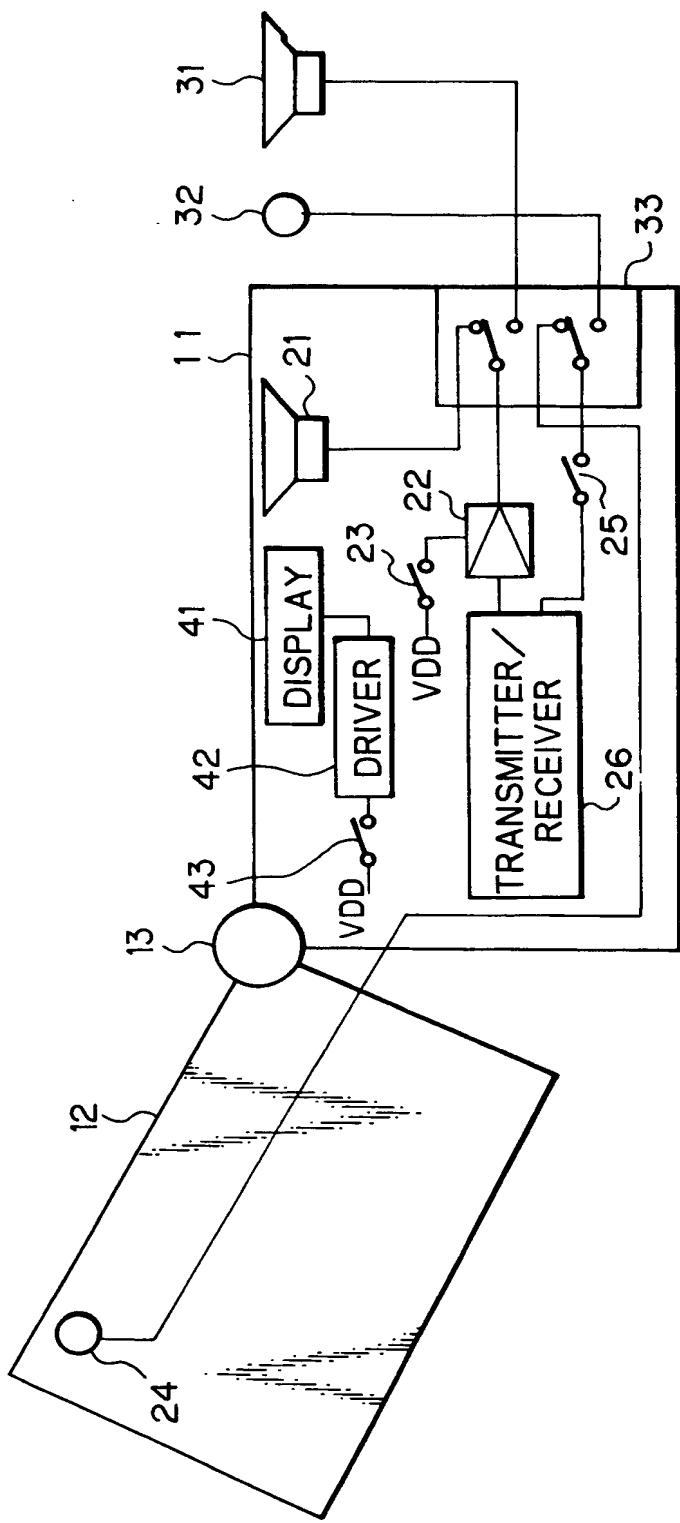


Fig. 2A

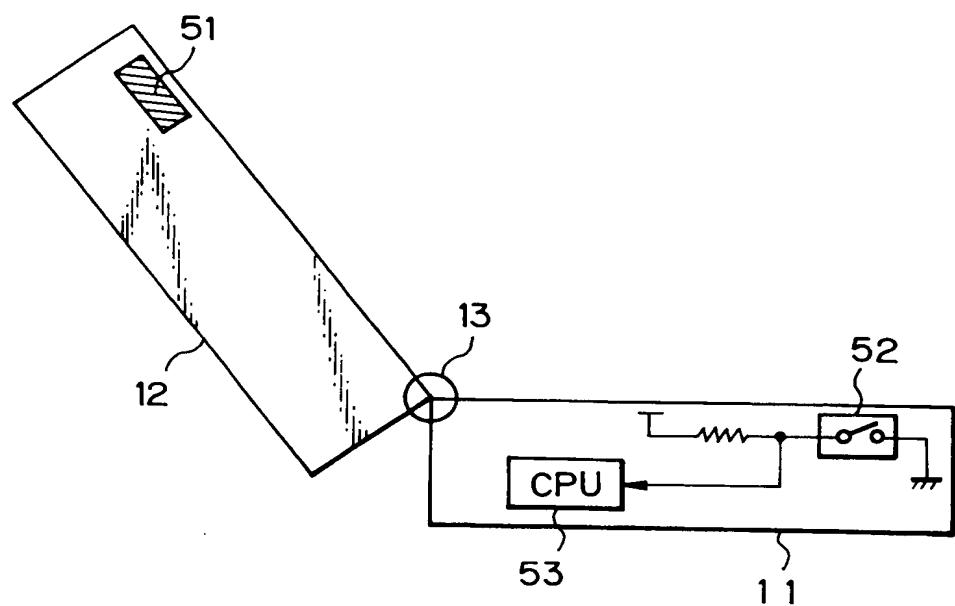
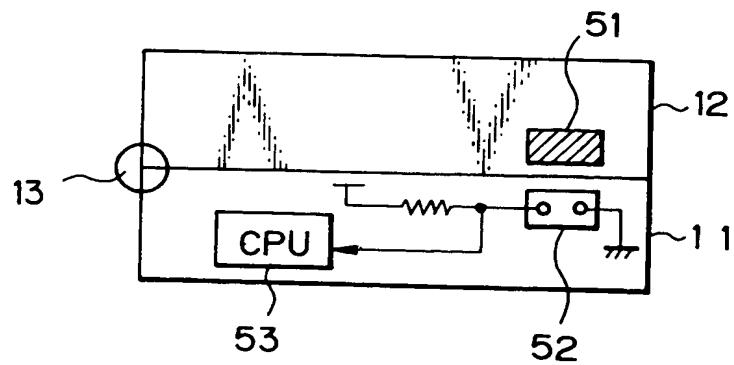


Fig. 2B





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EUROPEAN SEARCH REPORT

Application Number
EP 94 30 0219

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.CLS)
X	<p>WO-A-91 07836 (MOTOROLA INC.) * page 4, line 4 - page 8, line 7; figures 1-5 *</p> <p>* page 9, line 19 - page 16, line 18; figures 6-8 *</p> <p>---</p>	1-5	H04M1/02
A	<p>GB-A-2 158 328 (BRANDENSTEIN) * page 2, line 24 - page 3, line 68; figures 1-4 *</p> <p>---</p>	1,2	
A	<p>WO-A-92 17974 (MOTOROLA INC.) * page 7, line 3 - line 29; figure 3 *</p> <p>* page 12, line 6 - line 24; figure 8 *</p> <p>---</p>	1,6	
A	<p>EP-A-0 473 402 (NEC) * column 2, line 22 - column 4, line 2; figures 1-4 *</p>	1,7	
A,D	<p>& PATENT ABSTRACTS OF JAPAN vol. 16, no. 354 (E-1242) 30 July 1992 & JP-A-04 111 655 (NEC CORP.) * abstract *</p> <p>-----</p>		<p>TECHNICAL FIELDS SEARCHED (Int.CLS)</p> <p>H04M H04B</p>
<p>The present search report has been drawn up for all claims</p>			
Place of search	Date of completion of the search		Examiner
THE HAGUE	21 April 1994		Delangue, P
CATEGORY OF CITED DOCUMENTS		<p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons O : member of the same patent family, corresponding document</p>	
<p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p>			